

Preliminary Technical Data

ADG721/ADG722/ADG723

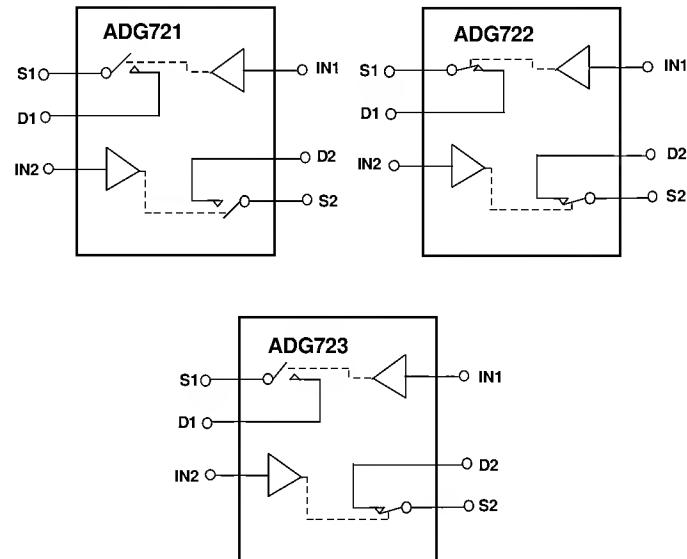
FEATURES

- +1.8V to 5.5V Single Supply
- 2Ω On Resistance
- Bandwidth 100MHz
- Rail to Rail Operation
- Very Low Distortion
- 8-lead μSOIC Package
- Fast Switching Times
 - t_{ON} 20 ns
 - t_{OFF} 10 ns
- Low Power Consumption (1μW)
- TTL/CMOS Compatible

APPLICATIONS

- Battery Powered Systems
- Communication Systems
- Sample Hold Systems
- Audio Signal Routing
- Mechanical Reed Relay Replacement

FUNCTIONAL BLOCK DIAGRAMS



GENERAL DESCRIPTION

The ADG721, ADG722 and ADG723 are monolithic CMOS SPST switches. These switches are designed on an advanced sub-micron process which provides low power dissipation yet gives high switching speed, low on resistance and low leakage currents.

The ADG721, ADG722 and ADG723 are designed to operate from a single +1.8V to +5.5V supply making them ideal for use in battery powered instruments, and with the new generation of DACs and ADCs from Analog Devices.

The ADG721, ADG722 and ADG723 contain two independent single-pole/single throw (SPST) switches. The ADG721 and ADG722 differ only in that both switches are normally open and normally closed respectively. While in the ADG723, switch 1 is normally open and switch 2 is normally closed.

Each switch of the ADG721, ADG722 and ADG723 conducts equally well in both directions when ON. The ADG723 exhibits break before make switching action.

PRODUCT HIGHLIGHTS

1. +2V/+3V/+5V Single Supply Operation. The ADG721, ADG722 and ADG723 offer high performance, including low on resistance and fast switching times and is fully specified and guaranteed with +2V, +3V and +5V supply rails.
2. Low R_{ON} (2Ω).
3. Bandwidth 100MHz.
4. Low power dissipation. CMOS construction ensures low power dissipation.
5. Fast T_{ON}/T_{OFF} .
6. 8-lead μSOIC.

Preliminary Technical Data

ADG721/ADG722/ADG723

ADG721/ADG722/ADG723—SPECIFICATIONS¹

($V_{DD} = 5V \pm 10\%$, GND = 0 V. All specifications $-40^\circ C$ to $+85^\circ C$, unless otherwise noted.)

Parameter	B Version $-40^\circ C$ to $+25^\circ C$	$+85^\circ C$	Units	Test Conditions/Comments
ANALOG SWITCH				
Analog Signal Range	0 V to V_{DD}		V	
On-Resistance (R_{ON})	2	5	Ω typ Ω max	$V_S = 0V$ to 5V
On-Resistance Match Between Channels (ΔR_{ON})		1.0	Ω typ Ω max	
On-Resistance Flatness ($R_{FLAT(ON)}$)		1.0	Ω typ Ω max	
LEAKAGE CURRENTS				TBD
Source OFF Leakage I_S (OFF)		2.0	nA typ nA max	
Drain OFF Leakage I_D (OFF)		2.0	nA typ nA max	
Channel ON Leakage I_D , I_S (ON)		4.0	nA typ nA max	
DIGITAL INPUTS				
Input High Voltage, V_{INH}		2.4	V min	
Input Low Voltage, V_{INL}		0.8	V max	
Input Current I_{INL} or I_{INH}	0.005	± 0.5	μA typ μA max	$V_{IN} = V_{INL}$ or V_{INH}
DYNAMIC CHARACTERISTICS ²				TBD
t_{ON}		20	ns max	
t_{OFF}		10	ns max	
Break-Before-Make Time Delay, t_D (ADG723 only)	1	1	ns min	
Charge Injection	10		pC typ	
Channel-to-Channel Crosstalk	85		dB typ	
Bandwidth -3dB	100		MHz typ	
Bandwidth ± 0.1 dB	TBD		MHz typ	
Off Isolation C_S (OFF) C_D (OFF) C_D , C_S (ON)	80	TBD	dB typ pF typ pF typ pF typ	
POWER REQUIREMENTS				$V_{DD} = +5 V$ Digital Inputs = 0 V or 5 V
I_{DD}	0.0001	0.5	μA typ μA max	

NOTES

¹Temperature ranges are as follows: B Versions: $-40^\circ C$ to $+85^\circ C$.

²Guaranteed by design, not subject to production test.

Specifications subject to change without notice.

ADG721/ADG722/ADG723—SPECIFICATIONS¹(V_{DD} = 2.7V to 3.6V, GND = 0 V. All specifications -40°C to +85°C, unless otherwise noted.)

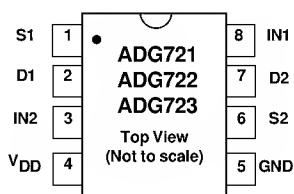
Parameter	B Version -40°C to +85°C		Units	Test Conditions/Comments
	+25°C	+85°C		
ANALOG SWITCH	Analog Signal Range On-Resistance (R_{ON})	0 V to V _{DD}	V	V _S = 0V to 3V
		2	Ω typ	
		8	Ω max	
On-Resistance Match Between Channels (ΔR_{ON})		1.0	Ω typ Ω max	
On-Resistance Flatness ($R_{FLAT(ON)}$)		2.0	Ω typ Ω max	
LEAKAGE CURRENTS	Source OFF Leakage I _S (OFF) Drain OFF Leakage I _D (OFF)	2.0	nA typ nA max	TBD
		2.0	nA typ nA max	
Channel ON Leakage I _D , I _S (ON)		4.0	nA typ nA max	
DIGITAL INPUTS	Input High Voltage, V _{INH} Input Low Voltage, V _{INL} Input Current I _{INL} or I _{INH}	2.0	V min	V _{IN} = V _{INL} or V _{INH}
		0.4	V max	
		0.005	μ A typ μ A max	
DYNAMIC CHARACTERISTICS ²	t _{ON} t _{OFF} Break-Before-Make Time Delay, t _D (ADG723 only) Charge Injection Channel-to-Channel Crosstalk Bandwidth -3 dB Bandwidth ± 0.1 dB Off Isolation C _S (OFF) C _D (OFF) C _D , C _S (ON)	30	ns max	TBD
		15	ns max	
		1	ns typ	
		10	pC typ	
		85	dB typ	
		110	MHz typ	
		TBD	MHz typ	
		80	dB typ	
		TBD	pF typ	
		TBD	pF typ	
		TBD	pF typ	
POWER REQUIREMENTS	I _{DD}	0.0001	μ A typ μ A max	V _{DD} = +3 V Digital Inputs = 0 V or 3 V
		0.5		

NOTES

¹Temperature ranges are as follows: B Versions: -40°C to +85°C.²Guaranteed by design, not subject to production test.

Specifications subject to change without notice.

PIN CONFIGURATION (MICRO SOIC)



ORDERING GUIDE

Model ¹	Temperature Range	Package Option ¹
ADG721BRM	-40°C to +85°C	RM-8
ADG722BRM	-40°C to +85°C	RM-8
ADG723BRM	-40°C to +85°C	RM-8

NOTES

¹RM = microSOIC.

Truth Table (ADG721/ADG722)

ADG721 In	ADG722 In	Switch Condition
0	1	OFF
1	0	ON

Truth Table (ADG723)

Logic	Switch 1	Switch 2
0	OFF	ON
1	ON	OFF

ABSOLUTE MAXIMUM RATINGS¹

(T_A = +25°C unless otherwise noted)

V_{DD} to GND -0.3 V to +7 V

Analog, Digital Inputs² -0.3V to V_{DD} +0.3 V or 30 mA, Whichever Occurs First

(Pulsed at 1 ms, 10% Duty Cycle max)

Operating Temperature Range

Industrial (B Version) -40°C to +85°C

Storage Temperature Range -65°C to +150°C

Junction Temperature +150°C

microSOIC Package, Power Dissipation 450 mW

θ_{JA} Thermal Impedance 206°C/W

θ_{JC} Thermal Impedance 44°C/W

Lead Temperature, Soldering

Vapor Phase (60 sec) +215°C

Infrared (15 sec) +220°C

ESD 2kV

NOTES

¹Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those listed in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Only one absolute maximum rating may be applied at any one time.

²Overvoltages at IN, S or D will be clamped by internal diodes. Current should be limited to the maximum ratings given.

CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although the ADG721, ADG722 and ADG723 feature proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.

TERMINOLOGY

V_{DD}	Most positive power supply potential.
GND	Ground (0 V) reference.
S	Source terminal. May be an input or output.
D	Drain terminal. May be an input or output.
IN	Logic control input.
R_{ON}	Ohmic resistance between D and S.
ΔR_{ON}	On resistance match between any two channels i.e. $R_{ONmax} - R_{ONmin}$.
$R_{FLAT(ON)}$	Flatness is defined as the difference between the maximum and minimum value of on-resistance as measured over the specified analog signal range.
I_S (OFF)	Source leakage current with the switch "OFF."
I_D (OFF)	Drain leakage current with the switch "OFF."
I_D, I_S (ON)	Channel leakage current with the switch "ON."
$V_D (V_S)$	Analog voltage on terminals D, S.
C_S (OFF)	"OFF" switch source capacitance.
C_D (OFF)	"OFF" switch drain capacitance.
C_D, C_S (ON)	"ON" switch capacitance.
t_{ON}	Delay between applying the digital control input and the output switching on.
t_{OFF}	Delay between applying the digital control input and the output switching off.
t_D	"OFF" time or "ON" time measured between the 90% points of both switches, when switching from one address state to another. (ADG723 only).
Crosstalk	A measure of unwanted signal which is coupled through from one channel to another as a result of parasitic capacitance.
Off Isolation	A measure of unwanted signal coupling through an "OFF" switch.
Charge Injection	A measure of the glitch impulse transferred during switching.

MECHANICAL INFORMATION

Dimensions are shown in inches and (mm).

8-Lead microSOIC (RM-8)

